Peat, Marwick and Partners

DEPARTMENT OF COMMUNICATIONS

A Study of the Effects of Intermodal Competition on the Canadian Telecommunications Industry and Services

May, 1983

Peat, Marwick and Partners

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May 13, 1983

Mr. T.W.J. Rochefort
Director
Industry Structure and Services
National Telecommuication Branch
Department of Communications
300 Slater Street
Ottawa, Ontario
K1A 0C8

Dear Mr. Rochefort:

This document contains the final report of the Satellite/Terrestrial Intermodal Competition Study. We are pleased to have been asked to carry out this study for the Department.

During the conduct of this engagement, including the companion Large Business Satellite Demand Study, we had occasion to meet with a very large number of knowledgeable individuals from the industry, government and regulatory bodies. We appreciate very much the excellent cooperation which we received throughout the study.

We also appreciate the time which you and your colleagues on the Steering Committee made available to us for discussions and workshops during the conduct of the engagement.

Yours very truly,

PEAT, MARWICK and PARTNERS

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I - EXECUTIVE SUMMARY

INTRODUCTION AND BACKGROUND

The purpose of this study was to develop forecasts of the short and long-term effects which satellite/terrestrial intermodal competition would have on telecommunications rates and services and on the financial performance of the carriers.

Our approach to this study consisted of five main aspects:

- Development of a competitive framework.
- Delineation of competitive advantages.
- Formulation of likely competitive advantages.
- Simulation of market split.
- Analysis of effects.

We conducted a large number of interviews during the early phases of the project in order to ensure that the market split model which we developed was as realistic as possible. As is often the case in a study of this type, restrictions on the availability of detailed data caused us to conduct the market split estimates at a higher level of aggregation than we had originally intended. It soon became apparent, however, that one key market segment required more detailed study. Accordingly, we carried out some additional work to examine the potential market among large businesses in Canada for private lines and private networks on satellite. The results of that study are contained in a separate report.

The analysis of the results of the market split model and estimates of the quantitative and qualitative effects of intermodal competition under various competitive scenarios completed this study.

MAJOR FINDINGS OF THE STUDY

In carrying out this study, we were required to make a number of estimates and assumptions due to shortages of data, lack of acceptable forecasts and uncertainties with respect to policy alternatives. We have attempted to specify our assumptions, estimating methods and decision rules at the appropriate points in this report. In interpreting these findings, the underlying assumptions and estimates must be kept in mind.

With respect to the effect on carrier revenues, our findings are as follows:

- TCTS member companies would incur a slight loss in operating revenues under competitive conditions. In the medium term, under the basic competitive scenario, reductions in operating revenue would be of the order of 1-2%.
- CNCP Telecommunications would experience a reduction in revenue of 7-10% in the medium term, unless full national interconnection was permitted.
- Telesat would receive an increase in operating revenues under all competitive scenarios. In the medium term, increases of the order of 60-80% could result even with limited national interconnection.

Our findings with regard to the effect of competition on carriers' net incomes are as follows:

- TCTS member companies would each experience a slight reduction in net income due to decreased operating revenues as a result of competition. In the short term, however, net income would actually increase upon termination of the guaranteed rate of return to Telesat.
- CNCP Telecommunications would incur a significant drop in net income in the short term due to excess capacity, with modest improvements from this position over time as normal growth takes place.

- Telesat Canada would suffer an extremely significant short term drop in net income due to loss of the guaranteed rate of return, which would be offset to some extent by increased operating income. Over the medium term (three to five years), Telesat Canada would benefit from competition.

With respect to the impact on local rates, we found:

- Under the basic competitive scenario, no short term increases in local rates would be required to offset the effects of competition for TCTS members.

- Over the medium term, the most significant impact on local rates would take place if increases in local rates were used to offset the entire impact of competition, and the basic competitive scenario indicates local rate increases ranging from 2% in the case of Bell Canada to 7% in the case of Island Telephone Company would then occur.

- Somewhat higher increases would result from the other three competitive scenarios, particularly in the case of the full national interconnection scenario.

The impact on the Canadian Aerospace industry is as follows:

- Provided Canadian content is maintained, the earth station manufacturing industry will benefit by upwards of 230 jobs, depending on the competitive scenario.

- Changes in the earth station licensing policy could reduce the government's influence with respect to Canadian content.

- Although there would be no immediate impact on the Canadian space manufacturing industry, increased utilization of existing satellites would be expected to benefit this segment of the industry by ensuring the renewal of space capacity as existing satellites are retired.

Our findings with respect to the less quantitative issues are:

- The ability of Telesat to continue to borrow in order to satisfy its cyclical debt requirements without benefit of the guaranteed rate of return from TCTS members is uncertain.

- Short term impacts of competition on the net income of Telesat due to termination of the guaranteed rate of return would make financing difficult, although medium term prospects appear to be good.

- The impact of competition on the range of services offered is expected to be favourable to telecommunications users.

- No impairment of service to the North is expected.

- In a competitive environment, Telesat would be expected to be granted limited interconnection with Bell Canada, British Columbia Telephone Company and CNCP Telecommunications. The granting of interconnection with the provincially-regulated telephone companies is questionable.

- The impact of competition on TCTS revenue settlement procedures would be minimal.

- The desirability of competition in particular circumstances, including competition from other satellite operators, is entirely dependent on broad government policy considerations.

DISCUSSION

In arriving at these findings, we have necessarily based our analysis on assumptions, estimates and forecasts for a number of uncertainties and variables. We are confident, however, that our approach to the formulation of the competitive framework which included an extensive interview program, and our further work on the Large Business Satellite Demand Study, render these findings valid.

We are aware that the telecommunications carrier industry is wary of competition, and some readers may find our estimates of the impact of competition optimistic. We would point out that we have not projected any significant stimulation of the market as a result of competition, and that our estimates should accordingly be viewed as conservative.

In our view, the study benefitted to a significant extent from the data and information gathered during the Large Business Satellite Demand Study. It is primarily on the basis of these results that we based our market split, and it is our firm view that there is an untapped market of sophisticated telecommunications users who are prepared to invest time and money to upgrade their telecommunications capabilities.

CONCLUSIONS

The conclusions of our study of the effect of intermodal (satellite/terrestrial) competition on the Canadian telecommunications industry, on its subscribers and on the Canadian aerospace industry are the following:

- For members of the TransCanada Telephone System and their subscribers, the effects of competition on rates and revenues would be very small as long as the monopoly status of message toll is maintained.

- For CNCP Telecommunications, the effects of competition would be expected to be quite significant as long as the monopoly status of message toll is maintained. Because most of its services are offered on a competitive basis, CNCP Telecommunications would probably not seek to increase other rates to offset this effect. Its subscribers would not be expected to experience a change in rates.

- The short term financial performance of Telesat Canada would suffer to a very significant extent due to the loss of the guaranteed rate of return. In the medium term, however, financial prospects would be quite good. The question of the ability of Telesat to continue to obtain debt financing in the absence of the guaranteed rate of return is beyond the terms of reference of this study.

- The Canadian aerospace industry would benefit from the creation of a competitive environment, provided that Canadian content levels can be maintained.

- Stimulation of demand and the development of new service opportunities for both satellite and terrestrial as well as integrated services could result from marketing efforts directed to large businesses and governments.

- Other than modest increases in local rates, if this is the approach used to offset the effects of competition, no negative impacts on the range or quality of services would be expected to result from satellite/terrestrial competition.

II - INTRODUCTION

In this introduction, we provide background to the study in the form of an historical perspective of regulatory and government decisions affecting satellite communications in Canada. We describe the terms of reference of this study, describe our overall approach to the study and the methodology developed for this study. Finally, this chapter makes reference to studies carried out by others in the subject area and the relationship of those studies to this work.

BACKGROUND TO THE STUDY

Telesat Canada was incorporated in 1969 by an Act of parliament (an Act to Establish a Canadian Corporation for Telecommunication by Satellite, commonly known as the Telesat Canada Act). Of the authorized capital of ten million common shares and five million preferred shares, a total of 6,000,002 common shares have been issued. The Government of Canada holds three million shares, the "approved telecommunications common carriers" hold among them a total of three million shares, the Chairman of the Board holds one share, and the President holds one share.

Telesat Canada is in the class of Canadian Corporations usually referred to as "mixed corporations". That is, although almost 50 percent of the shares are held by the Government of Canada, it is not a Crown Corporation. In particular, this means that it is not subject to the Financial Administration Act. However, the Government of Canada does play a role in the operation of Telesat in addition to that normally played by a shareholder, such as the election of Directors, and the attendance at annual meetings. For example, section 10(2) of the Telesat Canada Act requires Governor in Council approval for the issuance of shares. Section 12(4) requires Governor in Council approval for changing the number of Directors. Section 14(1) requires Governor in Council approval on the election of the President and Chief Executive Officer.

The Minister of Communications also plays a role in vetting contracts entered into by Telesat. For example, Section 9 limits the ability of Telesat to

negotiate with or enter into arrangements or agreements with foreign states or their representatives. One of the most controversial sections of the Telesat Act also fits into this category. This is Section 8, designed to ensure reasonable utilization of Canadian design and engineering skills and the incorporation of Canadian components and materials in the satellite and earth stations which Telesat requires. Decisions made by the Minister under Section 8 of the Telesat Act have resulted in a number of instances in the payment to Telesat of cost differentials between the prices offered by Canadian and US prime contractors for satellites.

Regulation of Telesat Canada

Telesat Canada is regulated by the Canadian Radio-television and Telecommunications Commission (CRTC). By virtue of Section 320 of the Railway Act, every company in the legislative authority of the Parliament of Canada having power to construct or operate a telegraph or telephone system or line or to charge telegraph or telephone tolls is subject to regulation by the CRTC. This means that all contracts, agreements and arrangements between the regulated company and any other company are subject to the approval of the Commission. This latter requirement is contained in Section 320(11) of the Railway Act.

An Historical Perspective

In order to fully understand the background of this study, it is necessary to go back to the formulation of the agreement between Telesat Canada and the members of the TransCanada Telephone Systems (TCTS). TCTS is an association of the major Canadian telecommunications carriers. That is, it includes Bell Canada, British Columbia Telephone Company, and the seven provincially-regulated companies in Alberta, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, PEI, and the more densely populated areas of Newfoundland. TCTS does not include NorthWest Tel, Terra Nova Tel, or CNCP Telecommunications. There are many other smaller telephone companies in Canada including Québec Tel, Télébec, and the independent telephone companies in Ontario. These firms gain access to the nation-wide trans-Canada network through connecting agreements with members of the TransCanada Telephone System. NorthwestTel and Terra Nova Tel also have interconnecting agreements with TransCanada members.

CNCP Telecommunications competes with the TransCanada Telephone System for many services, particularly data and business services, private line, and so on. There is partial interconnection between CNCP Telecommunications and the federally regulated TCTS members. That is, customers of CNCP telecommunications have "dial-up" access to CNCP's facilities for certain private line services. However, the monopoly of the telephone companies for message toll service (MTS) traffic on the switched network has been preserved.

Telesat Canada and the TransCanada Telephone System members negotiated an agreement by which Telesat would become a member of the TransCanada Telephone System effective December 31, 1976. There are a number of significant provisions in this Agreement. Clause 17 of the Agreement provides for a guaranteed after-tax minimum rate of return on that portion of its common equity reasonably allocable to the provision of service to TCTS. Clause 6 of the Agreement provides that Telesat's satellite system would be used to form a combined terrestrial and satellite TransCanada Telecommunications Network, and the "regulated Canadian telecommunciations common carriers", as defined in the agreement, have the sole right to market services, with the exception of experimental services or other specialized space activities not related to the business of TCTS.

The Minister of Communications approved the draft Agreement prior to its coming into effect, conditional upon the Agreement receiving the approval of the CRTC. Telesat, Bell Canada, and BCTel applied to the CRTC for approval of the connecting agreement.

CRTC Decision 77-10 and Decision of the Governor in Council

Following a public hearing, the CRTC issued Decision 77-10 on August 24, 1977, in which it did not approve the Agreement between Telesat Canada and the members of the TransCanada Telephone System. The applicants petitioned the Governor in Council to vary the decision, as the Governor in Council is empowered to do by virtue of Section 64(1) of the National Transportation Act. On November 3, 1977, the Governor in Council found the Agreement to be in the public interest and varied Decision 77-10 so as to approve the Agreement. In issuing Order

in Council P.C. 1977-3152, the press release issued by the then Minister of Communications, the Honourable Jeanne Sauvé, stated that the Governor in Council's decision "reflects the broad policy of the Government with respect to fostering satellite communications service for Canadians".

One of the basic objectives of the Agreement was to provide Telesat with the security necessary to finance its C-Series of satellites, a new series of higher frequency satellites operating at 14/12 GHz which at that time were expected to cost some $180 million. Under the Telesat Act, Section 41, the total amount of loans and loan guarantees by the Government is limited to $40 million. The Government was apparently unwilling to amend the Act so as to provide for the guarantee of the borrowings required to finance the C-Series of satellites. In addition, Telesat would have required additional financing for the D-Series which would replace the A-Series of lower frequency 6/4 GHz satellites. In the absence of Government guarantees, funding for satellites and for operating purposes would be limited. The guaranteed rate of return by the TransCanada members under the connecting agreement provided the security for this financing.

Subsequently, Canadian Pacific Limited and Canadian National, shareholders of Telesat, filed suit in the Supreme Court of Ontario questioning the legality of the Agreement. Basically, the question was whether or not the agreement was within the powers of Telesat, and whether Telesat was empowered to delegate certain responsibilities to the TransCanada Telephone System. This case went to trial where it was decided that the Agreement was indeed within the powers of Telesat.

CRTC Decision 81-13 and Decision of the Governor in Council

As part of a major hearing on the rates to be charged for TransCanada services, including an investigation of the Full Division Plan and the Revenue Settlement Plan, the CRTC considered Telesat's proposed tariff CRTC 8001 (the General Tariff) and the Agreement between TCTS and CBC. Up until this time, Telesat had provided its services on the basis of special assembly tariffs which were filed prior to the commencement of service. This was the first time that

Telesat had made a tariff filing for a general tariff. The tariff and the Agreement were filed with the Commission on September 20, 1979.

During the Public Hearing held in the Spring of 1980, the CRTC considered Telesat's proposed tariffs including the rates and conditions of service. One major concern was the restriction in Telesat's customer base, by which it would deal only with the regulated Canadian telecommunications common carriers. Broadcast News Limited, a subsidiary of Canadian Press, argued that by refusing to provide satellite communications services to all but regulated common carriers, Telesat was in violation of Sub-Section 265(1) of the Railway Act. Much of the Hearing on Telesat's services consisted of an examination of the Telesat-TCTS Agreement. Approximately one year later, on July 7, 1981, CRTC issued Telecom Decision 81-13. Part 5 of this decision related to satellite matters. In this part, the Commission found that the limitation of Telesat's customer base is contrary to Section 321 of the Railway Act, and directed Telesat to refile this tariff item without limitation of its customer base within 30 days of the date of the decision.

Telesat Canada, Bell Canada, and BC Tel all submitted petitions asking the Governor in Council to vary Decision 81-13. It was pointed out that certain of the orders contained in Part 5 of Decision 81-13, if implemented, would require Telesat Canada to carry on business contrary to the TCTS Connecting Agreement dated December 31, 1976. The petitioners pointed out that the Connecting Agreement was found to be in the public interest and was approved by the Governor in Council in 1977. There was considerable concern that a filing by Telesat in the manner ordered by the Commission would render the Connecting Agreement void, and Telesat would no longer meet certain requirements of its banking agreements and the indentures for its private debt placements. Accordingly, in August of 1981, the Governor in Council suspended the coming into effect of Part 5 of Decision 81-13 so that it could consider the matter further. In December 1981, a further decision by the Governor in Council provided for a limitation of Telesat's customer base, provided, however, that Telesat would offer to lease full R.F. channels to broadcasting undertakings for purposes pursuant to the Broadcasting Act and would make partial RF channels available to regulated Canadian telecommunications common carriers. Bell Canada and B.C. Tel were also ordered to file tariffs for partial satellite channels.

TERMS OF REFERENCE

The terms of reference for this engagement were provided in the form of a "Statement of Work" which specified two requirements as follows:

"1. The contractor will develop forecasts of the short and long-term effects which intermodal competition (Telesat vs the terrestrial carriers) will have on telecommunications rates and services and on the financial performances of the carriers themselves.

2. In particular, the contractor will evaluate the effect of this competition on the following:

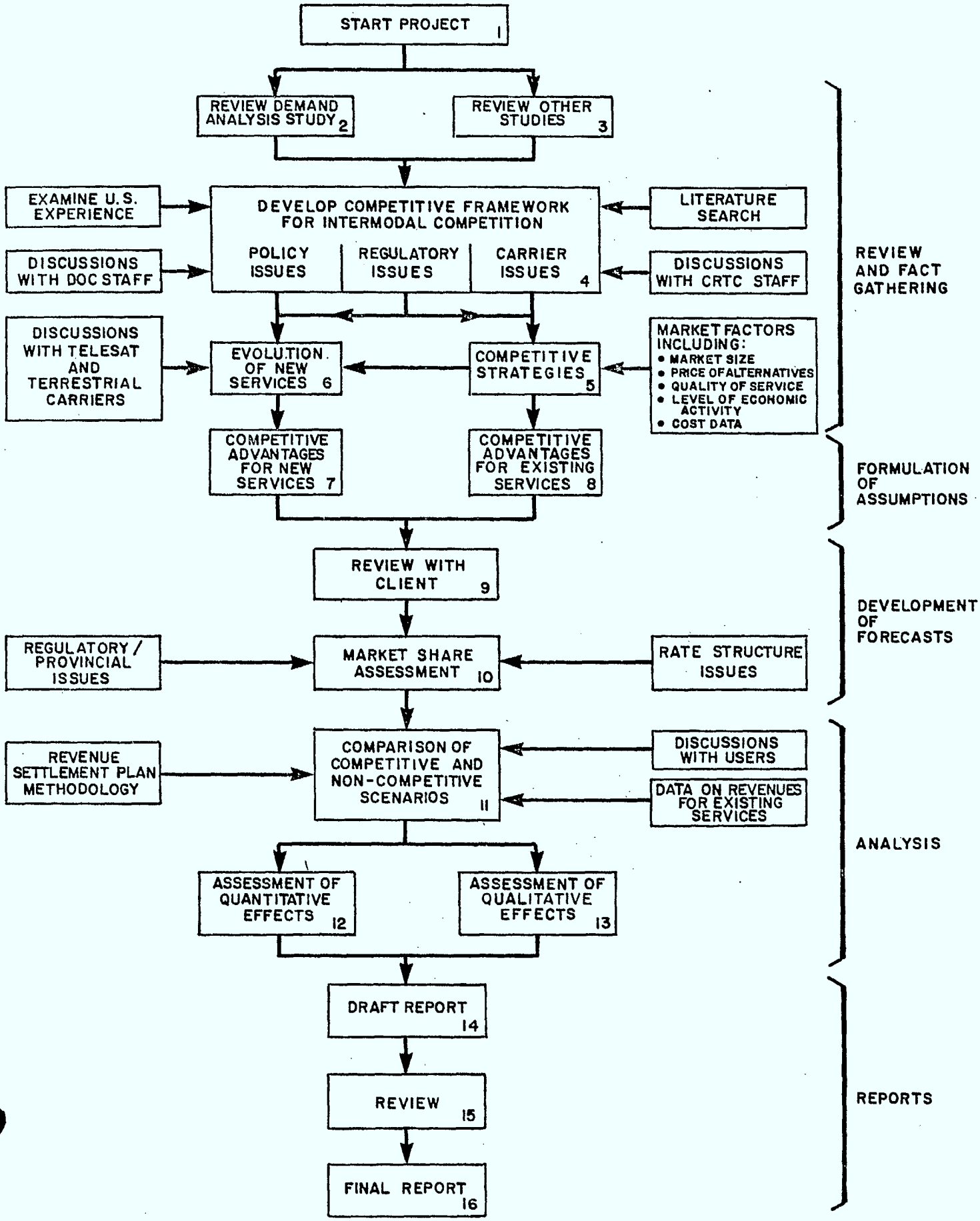
- intercity telecommunications service rates and range of services offered
- the financial performances of Telesat and the terrestrial carriers
- benefits to users of long-distance telecommunications services
- local telephone rates
- Telesat's ability to deliver service to the North
- Telesat's ability to foster the development of an aerospace equipment manufacturing sector in Canada
- the ability of Telesat to obtain interconnection with non-federally regulated telecommunications carriers in a competitive environment
- the effect of settlement procedures arising from interconnection with terrestrial carriers, in a competitive environment
- the probability and impact of operators of competitive satellite systems entering the market."

APPROACH AND METHODOLOGY

Our approach to the assessment of the effects of intermodal competition, as specified in the terms of reference, consisted of five main aspects. These included:

EXHIBIT I

STRUCTURE OF STUDY



- Development of a competitive framework.
- Delineation of competitive advantages.
- Formulation of likely competitive strategies.
- Simulation of market split.
- Analysis of effects.

Exhibit 1, opposite, provides an overview of how these five main aspects of our approach fit into the overall structure of our study. In particular, this overview describes the nature of the required inputs from policy makers, from carriers, from regulators, and from end users.

The first step in the study was to develop an initial formulation of the terms and conditions under which competition between the satellite carrier and the terrestrial carriers would take place. This initial formulation was then discussed with government policy-makers, carriers, regulators, and end users, in order to ensure that the proposed scenario for intermodal competition was realistic in the sense that it was capable of being implemented, regardless of the views of those parties as to whether or not it should be implemented. This task itself was the subject of much interesting discussion.

The factors or criteria used by decision-makers in choosing between alternative available technologies were explored in detail with carriers and users of telecommunications services. That is, where a carrier is providing an end-to-end service, and where the user of the service is, to all intents and purposes, not concerned with the technology used to provide that service, we regard this as a case in which the telecommunications carrier itself is responsible for making the choice of facilities. Often in the case of large and sophisticated users of telecommunications services, however, it is the user itself which leases "facilities" from carriers and establishes its own private network. In these cases, it is the end-users who are making the decisions as to the choice of facilities.

During the course of this study, we conducted a large number of interviews and held numerous discussions with experts, policy-makers and representatives of carriers and users. A list of all persons interviewed is attached as Appendix A.

We concentrated the early part of our interviews on a detailed discussion of the factors or criteria which are taken into account by decision-makers in making the choice of facilities. We also attempted to establish a ranking or priority for these factors, or attempted to understand the way in which the decision-maker was prepared to trade off one requirement for another. The purpose of this aspect of the interviews was to establish, in the absence of competitive strategies, how the market for telecommunications services would be split between satellite and terrestrial facilities based only on the inherent characteristics of the technologies.

Next, we discussed with the satellite and terrestrial carriers the competitive strategy they would likely adopt if competition as formulated were to be implemented. This step permitted us to define the relative advantages which satellite and terrestrial facilities would have in competition for existing services.

The evolution of new services was also explored in these interviews, with a view to delineating the competitive advantages which satellite and terrestrial facilities would have for new emerging services.

The analytical phase of the study involved the formulation of a simulation model. Scenarios reflecting basic competition, a liberalized earth station licensing policy and two levels of enhanced interconnection were formulated, and the revenues accruing to the terrestrial and satellite carriers were estimated for the years 1983, 1985 and 1987 in constant 1983 dollars under each scenario.

Using these estimates of revenue along with the TCTS Revenue Settlement Plan methodology, impacts on the TCTS member carriers, CNCP Telecommunications and Telesat Canada were examined. The impact on the aerospace industry was estimated using data developed in an earlier study of the aerospace industry carried out by Peat, Marwick and Partners for the Department of Industry, Trade and Commerce.

RELATIONSHIP TO OTHER STUDIES

Interim and final reports of two other studies were made available to us during the course of this study. The first of these was a study of Canadian EHF communication requirements and technology development by Canadian Astronautics Limited which provided estimates of the market for satellite services. The second study was entitled "Relevance of the U.S. Satellite Environment to the Canadian Scene" by Professor J.C. Strick of the University of Windsor.

We reviewed several other studies in the course of this engagement. These included the report by Charles River Associates Incorporated entitled "The Economics of Competition in the Telecommunications Industry", which focused on the U.S. scene, a paper by Janet Yale of the University of Toronto entitled "Telesat Canada's Membership in TransCanada Telephone System: A Critique", and many other reports and papers, some of which were provided to us by carriers on a confidential basis.

LARGE BUSINESS SATELLITE DEMAND STUDY

During the initial phases of this study, it became apparent that one of the major market segments which would have an impact on the market split between satellite and terrestrial facilities would be the private line and private network market. This segment of the market was not covered in detail by Canadian Astronautics Limited during their demand study. However, our discussions with a number of users and potential users of satellite services during the early phases of this study indicated a significant potential demand for satellite service among large businesses.

In order to include these considerations in the present study, it was necessary for us to obtain more detailed demand data on the potential line and private network applications. Accordingly, we formulated, in discussions with the

Department, an approach to obtaining the basic information, analyzing the data, and preparing the report within the overall stringent deadlines of this study.

Our survey of the telecommunications expenditures and traffic patterns of 24 large Canadian organizations and our analysis of the cost-effectiveness of satellite facilities for the provision of private line and private network services were used to estimate the potential satellite demand for the 250 largest organizations in Canada. The results of this Large Business Satellite Demand Study were used in developing the market split model for this study. A separate report was prepared on the Large Business Satellite Demand Study.

III - DEVELOPMENT OF A COMPETITIVE FRAMEWORK

In this section of the report, we discuss the nature of the issues which have an effect on the competitive environment and describe in detail the terms and conditions under which competition between the satellite and terrestrial carriers would take place. We then discuss the criteria which are used by decision makers in making the choice of technology for particular applications. The likely competitive strategy of the service-providers in a competitive environment is considered. Finally, we discuss the nature of the competitive advantages which satellite or terrestrial carriers would be likely to have in different applications, and combine this with scenarios reflecting significant policy alternatives in order to complete the competitive framework development.

DISCUSSION OF POLICY ISSUES

There are a number of policy issues which have relevance in the development of a Satellite/Terrestrial competitive framework. Some of these relate to the terms and conditions of competition, and this aspect is discussed in detail below. In structuring the study, we felt it was important to restrict the number of options to a workable number. Accordingly, in some cases we have selected, following consultation with the Department, one policy option for purposes of this study. However, there are a number of policy issues whose impact on competition is so significant that we felt that it would be inappropriate to tie the result of the study to one of the possible options. In these cases, namely earth station licensing and interconnection, we have developed scenarios reflecting the various possible options in order that the impact can be fully considered.

Policy Options

There are two policy issues for which, following discussions with government policy-makers at the Federal and Provincial level, regulators, carriers and users, we have selected options for use in this study in order to keep the

speculative nature of the scenarios studied to a minimum. These policy options include:

- other satellite operators in Canada
- Canada/US satellite communications.

Other Satellite Operators in Canada

For purposes of this study, we consider that Telesat will be the sole satellite operator for all applications, and for all new satellite systems which could be introduced. Accordingly, in our study, we have not examined the potential impact if TCTS were to launch its own satellite, or if new satellites systems such as MSAT were to be launched by operators other than Telesat Canada.

Canada/US Satellite Communications

In our study, we have assumed that Telesat will remain the sole agent for Canada/US satellite communications. Under this assumption, Telesat will carry approximately 50% of the Canada/US Satellite traffic. We are aware that it is possible for Teleglobe Canada to offer service on a Canada/US basis via Intelsat. For purposes of this study, however, we have assumed that Teleglobe's share of this market will be negligible.

Policy Scenarios

In this section, we discuss two policy issues which, in our view, will have a significant impact on the regulatory environment. These policy issues are therefore treated as different competitive scenarios in our study. The policy issues handled in this manner are as follows:

- interconnection
- earth station licensing.

Interconnection

There are two types or levels of interconnection which could be made between the satellite carrier and the terrestrial carriers. The first of these is the type of interconnection which CNCP makes with Bell Canada and BC Tel. In these cases, CNCP facilities may be connected to the public switch network (PSN) at one end only. In this way, CNCP facilities may be accessed on a dial-up basis using the public switched network as long as there is no subsequent re-entry from CNCP's facilities to the PSN. Similarly, CNCP can offer foreign-exchange type service by offering a private line service giving dial tone on a distant PSN exchange. It is apparent that this type of interconnection is designed to maintain the monopoly of the terrestrial carriers in the message toll business, inasmuch as it is not permissible to bypass the PSN on a dial-in/dial-out basis. Our basic competitive scenario includes the interconnection of Telesat and CNCP with Bell Canada and BC Tel on this basis. Our limited national interconnection scenario extends this interconnection to the remaining provincially-regulated telcos.

The second level of interconnection to be considered is full network interconnection, by which the satellite carrier would be permitted to offer a message toll service. This would place the satellite carrier in the position in being a specialized common carrier. Because it would be inconsistent to permit the satellite carrier to be a specialized common carrier without also providing CNCP with interconnection on the same terms, our scenario for network interconnection provides for both the satellite carrier and CNCP to have interconnection at this level. This scenario is termed "full national interconnection".

Earth Station Licensing

The issues of earth station licensing and earth station ownership can have an impact on the competitive environment. Under current DOC policy, a number of entities can be licensed to own and operate the TVRO (Television Receive Only)

earth stations. However, the licensing of transmit or up-link earth stations is restricted to Telesat and certain telecommunications carriers, with Telesat being the sole operator allowed to operate earth stations in the 6/4 Ghz frequency band. However, under the current Telesat-TCTS agreement, Telesat operates all up-link earth stations for TCTS services, with the TCTS members having a first option on the earth stations in their respective franchise areas should Telesat wish to divest of those earth stations.

During our Large Business Satellite Demand Study, we noted that the earth station licensing policy could have an impact on the demand for satellite services by large businesses and governments. Accordingly, in addition to the basic competitive scenario which is based on the existing DOC policy, we formulated one additional scenario which involves complete liberalization of the earth station licensing policy. In this scenario, any user of satellite services can be licensed to operate an uplink or downlink earth station operating with Canadian satellites.

DISCUSSION OF REGULATORY ISSUES

In this section of the report, we discuss a number of the regulatory issues which we considered in developing the competitive framework. These issues include:

- regulated competition
- rate making methodology
- volume discounts
- separate wholesale/retail tarifffs.

Regulated Competition

In carrying out a study on the effects of intermodal competition on the Canadian telecommunications industry and services, it is necessary to consider the nature of the competition which would take place. Based on the model which currently exists for competition between the TransCanada Telephone System and CNCP Telecommunications, we have adopted this model in our study. That is, the nature of the competition which we have studied is "regulated competition". This means that the rates charged for competitive services must be, at a minimum, the compensatory rate, and that carriers are not permitted to engage in predatory pricing.

In the absence of final decisions from the Cost Inquiry, we acknowledge the fact that costing of services is not a straightforward procedure. However, throughout this study and particularly in our discussions with the carriers and end-users, we have proposed the use of this definition of "regulated competition", and it was our experience that it was generally understood and agreed upon.

Rate Making Methodology

Throughout our study, we have assumed that no fundamental changes to rate making methodologies will take place. That is, the existing cross-subsidies, to the extent that they take place between toll services and local services or one form of local service and another, will continue to take place in the competitive environment. We understand, of course, that when certain services shift from a monopoly environment to the competitive environment the extent of cross subsidy may be changed. However, in our study, we do not contemplate significant changes in the rate making methodology to, say, a usage sensitive pricing methodology or a local measured service pricing methodology.

Volume Discounts

We have reviewed CRTC decisions with respect to volume discounts for satellite services as contained in CRTC decision 81-13. We have interpreted this decision as rejecting volume discounts in large part because there was only one potential customer for volume discounts, namely TCTS, and that it was TCTS who would benefit from these volume discounts. Telesat Canada would not have benefited from the volume discounts because it would not have received any additional business from TCTS as a result of those discounts.

Under the competitive scenarios which we consider in this study, we feel that the CRTC would be prepared to allow for volume discounts for two reasons. The first reason is that there would be more than one customer eligible for volume discounts. The second reason is that without the volume discount, the terrestrial carriers would not be in a position to offer satellite services on a price-competitive basis with Telesat, unless they were prepared to offer the service without a mark-up. Accordingly, we have provided for a volume discount on multiple transponders leased by the satellite carrier to any terrestrial carrier or user.

Separate Wholesale/Retail Tariffs

Another way of handling the issue of price competition between satellite and terrestrial carriers would be to provide for a separate wholesale and retail tariff for Telesat. That is, Telesat would lease transponders to terrestrial carriers for resale purposes at one rate, and would lease transponders to end-users at a higher rate. However, this approach would seem to be inconsistent with the requirements of the Railway Act that rates be just and reasonable and non-discriminatory. Accordingly, in our model we have assumed that separate wholesale and retail rates will not be permitted.

DISCUSSION OF CARRIER ISSUES

Other issues which arose during our study related to carrier-carrier relationships and other options for competition. These issues are discussed below.

Relationship Between Telesat and TCTS

There are two aspects of the relationship between Telesat and TCTS which are significant in considering a competitive framework. The first of these is the impact on the membership of Telesat in the TransCanada Telephone System. We cannot conceive of an agreement beteween Telesat and the TCTS members which would provide for intermodal competition. Throughout this study, then, we consider that all of the competitive scenarios have as one condition the termination of the existing Telesat-TCTS agreement.

It is also important to eliminate any opportunity for conflict of interest to arise. In our view, one example where conflict of interest could arise is the continued ownership and representation on the Board of Telesat by the terrestrial carriers. In our view, it would be necessary to terminate the carrier-ownership of Telesat. While this option has significant financial implications for the government and for Telesat, we feel that it is a necessary condition for creating an appropriate competitive environment.

Other Options for Competition

In developing our competitive framework, we were encouraged by certain parties to consider a competitive framework which would result in the termination of the Telesat-TCTS agreement, but which would retain Telesat's present role as a carrier's carrier. While we have not developed a point of view in this study as to whether or not such a competitive environment is desirable, it was clearly beyond the terms of reference of the present study. Accordingly, we did not give any consideration in this study to the existence of Telesat as a carrier's carrier outside the existing Telesat-TCTS Agreement.

TERMS AND CONDITIONS OF COMPETITION

In arriving at a realistic specification for the terms and conditions of competition for this study, a number of the issues discussed above were taken into account. For example, we consider that the only realistic approach to regulation in this context is to have "regulated competition". Similarly, the requirement for eliminating the possibility of conflict of interest would mean that, under the present circumstances of government and carrier ownership of Telesat, the carrier-ownership of Telesat would have to be terminated. Based on these and other considerations, we proposed and received approval during the Project Review Workshop for the following terms and conditions of competition:

- Regulated competition (compensatory rates).
- Existing Telesat/TCTS agreement terminated.
- Carrier ownership of Telesat terminated.
- Telesat offers whole and partial transponders under a general tariff.
- Telesat tariff provides for volume discounts.

CRITERIA FOR SELECTING FACILITIES

A large part of each interview with carriers and users was directed to ascertaining the criteria used by those decision-makers in making the choice of facilities. The criteria which are used by these decision-makers can be organized under the following headings:

- Direct economic considerations.
- Indirect economic considerations.
- Reliability considerations.
- Quality of service considerations.
- Technical considerations.
- Planning considerations.

The factors which are significant in making the choice of facilities under those of these general headings are described below.

Direct Economic Considerations

The most important consideration in the view of all those interviewed was keeping long run costs to a minimum. In most cases, the concept of long run cost is based on the minimum long run engineering cost computation performed by the carriers. Generally speaking, end-users also employ similar criteria in making these decisions, although the terminology used is somewhat different.

In addition to the long run cost, the return on investment is also an important economic consideration. That is, a carrier which has the choice of investing in its own facilities or leasing those facilities from others will take this into account in making the decision. The important difference is that carriers generally earn a return on investment (either as a return on the net asset rate base or as a return on the capital invested), whereas in the case of a lease, they do not have investment per se, but rather add a mark-up to the lease cost in order to generate a return. Associated with this return on investment aspect is the impact on capital requirements of the firm. While leased facilities have the disadvantage that they do not generate a continuing return over time, they also have the advantage of not requiring a capital outlay in advance.

The final direct economic consideration which carriers take into account is the impact on the sharing of revenues, in particular through the Revenue Settlement Plan of TCTS. Again, there are investment aspects to be considered, and also the impact on certain carriers when traffic which would otherwise be carried on their facilities bypasses those facilities through the use of other facilities such as satellite.

Indirect Economic Considerations

There are a number of factors involved in the decison-making process which, while they have an economic base, are more related to specific service requirements. For example, these include the type of topography (e.g., mountainous terrain as opposed to flat or nearly flat terrain), population density (e.g., remote, rural or urban) and the extent of the existing infrastructure (e.g., whether new facilities have to be constructed over a long distance, or whether service can be provided with a nominal extension to the existing network).

Another aspect of these indirect economic considerations is the speed with which service can be provided. For example, a satellite dish can be flown into a remote location along with the necessary local switching equipment and service can be provided very quickly on this basis. However, the cost comparison is not really valid because the microwave facilities cannot be installed within the required time frame. Accordingly, while there are economic considerations involved in the choice of facilities the overriding consideration in some cases is the requirement for service on short notice. A related consideration is the risk related to the salvage value of the investment, particularly in remote locations. When a microwave facility is constructed to meet the demand for service at a remote location, the carrier must also have confidence that the remote location will continue to exist for a sufficiently long period of time for the investment to be recovered. The salvage value of the systems is often zero or negative in that it may cost as much or more to remove the facilities as they are worth. Again, satellite facilities can be recovered quickly with a positive salvage value which often reduces the required payout period from, say, twenty years to five years. Accordingly, in cases where the economic viability of the industry in that remote location is in question, satellite facilities can provide a hedge against the risk even though, on a long run engineering cost basis, they might be more expensive in some cases.

A similar consideration is involved in the possible obsolescence of equipment. Facilities which can be recovered also provide a hedge against the risk of obsolescence which occurs with high cost microvave facilities which must be operated over a long time frame in order to recover the investment.

Reliability Considerations

There are a number of individual factors which can effect the relative reliability of facilities. The opportunity for human error is always present with any technology, and the nature of the service requirement and the required reliability of that service will affect the extent to which one technology will be preferable to another. Diversity is also an important consideration. Diversity is normally available through alternate microwave or coaxial cable routines on the terrestrial system, and through the use of back-up channels on satellite. However, the concept of diversity must include end-to-end diversity. Accordingly, fully protected satellite service does not involve the duplication of a dedicated earth station, and diversity on the terrestrial network may or may not involved duplication between the customer premises and the local switch. It will be apparent that the consideration of diversity means different things to carriers and to end users.

Restorability and maintainability are also factors within the overall consideration of reliability. While both these factors involve costs and economics to a certain extent, they are also considered separately in terms of the impact on customer requirements.

Quality of Service Considerations

The broad concept of quality of service has many aspects which relate to the choice of facilities for providing service. For example, the most obvious quality of service factor in terms of satellite transmission in the inherent delay of three hundred milliseconds which makes it unacceptable to put two satellites in tandem for voice transmission. In fact, CCITT standards do not permit the use of two satellites in tandem except in the case of private line facilities where the customer agrees to accept the double hop.

Quality of service related to data transmission includes considerations of the error rates and the availability of facilities having sufficient quality and bandwidth to meet the data transmission requirements. In this regard, assuming that transponders on the satellite are available, high speed data transmission can be provided by the installation of two appropriate earth stations at either end of the link. Provision of similar services on terrestrial facilities could involve considerable advance planning and construction if one or both ends of the link are not to close to established facilities. In addition, error rates in transmission are higher as the number of hops increases.

The final consideration under quality of service concerns the flexibility and integratability of different aspects of the service. Without going into detail on all of the various service requirements, it is apparent that satellite and terrestrial each have their own unique characteristics which will have advantages in certain applications, and not have advantages in other applications.

Technical Considerations

The main technical considerations involving the choice of facilities have to do with switching requirements and data transmission requirements. Overall, we were not given the impression that the technical considerations were an important factor in the choice of facilities. However, it is apparent that any technical requirements of a particular technology will have to be satisfied in order to make the best use of that technology. For example, in data transmission the delay inherent in satellite transmission means that longer streams of data have to be transmitted in order to take best advantage of the technology. This is because of the lower error rate with satellite transmission, and helps to make up for the disadvantage of the delay. Similarly, switching equipment must be modified in order to handle satellite transmission because of the delay. Again, this does provide some constraint on the applications for which satellite transmission can be used, although it is not an overriding consideration.

Planning Considerations

The lead time required for systems planning can affect the choice of technology. For example, the lead times required for overall satellite system planning and development is much longer than the lead time required for the extension of terrestrial facilities. In cases where integrated terrestrial and satellite facilities are to be used in providing a service, the longer planning cycle associated with satellite facilities must be used as the planning horizon for the integrated facilities.

COMPETITIVE STRATEGIES

In this section of the report, we discuss the competitive strategies which, based on our discussions with all parties, we would expect the various carriers to adopt in a competitive environment. In order to provide an appropriate comparison with the existing situation, we also describe what we perceive to be the strategy which each of these carrier groups is now employing. We discuss these strategies under the headings:

- TCTS Carriers.
- CNCP Telecommunications.
- Telesat Canada.

TCTS Carriers

Current Strategy

The current strategy of the member carriers of the TransCanada Telephone System appears to be one of joint planning with Telesat Canada. Under the terms of the Telesat-TCTS Agreement, the TCTS members guarantee a rate of return for Telesat Canada. Accordingly, it is apparent that there is some relaxing of the economic criteria for satellite use given that any shortfall in Telesat's rate of return would have to be made up by the TCTS member carriers in any case.

Accordingly, it is natural that the criteria for use of satellites by the TCTS members would take into account this obligation to maintain a minimum rate of return for Telesat Canada as specified in the Telesat-TCTS Agreement.

However, it is also our perception that the TCTS member carriers tend to minimize their dependence on facilities not under their control. To this extent, it appears that the member carriers do not view the satellite facilities as being under their control, and their current strategy appears to take this into account to some extent, particularly in terms of long term planning.

Competitive Strategy

In our view, if satellite and terrestrial facilities were in head-to-head competition, the economic criteria used by the TCTS member carriers in making the choice of facilities would be modified to the extent that satellite facilities would be used less than they are now. In other words, we perceive that rather then bending the rules in favour of satellite use as the carriers now appear to do, they would look for excuses not to use satellite.

The nature of the rate making process for Telesat Canada means that the more transponders in service, the lower the rates to be charged to all customers. Accordingly, the use of satellite facilities by TCTS member carriers in a competitive environment would mean that Telesat's rates would be lower than they would otherwise be. It is likely that the TCTS members carriers would take this into account in making the choice of facilities in order to minimize the extent to which they were improving the competitive position of a competitor. However, it is likely that certain services would have to continue to be offered on satellite. This includes, in particular, the Northern service provided by Bell Canada. In addition, some customers might insist on obtaining all their service, including satellite service, through the TCTS member carrier in whose franchise area they are located. Again, in these cases, the TCTS member carrier would lease the capacity from Telesat Canada.

In terms of the technical and reliability factors, it appears that there would be less use of satellite for voice message toll service because three-way diversity is not really required. There are certain services, including the Integrated Satellite Business Network (ISBN), a TCTS offering which includes the integration of satellite and terrestrial facilities, which is dependent on satellite facilities. However, it is expected that the TCTS carriers would attempt to duplicate the ISBN, including the TDMA technology, on terrestrial facilities.

It is also likely that the TCTS carriers would seek further changes in the earth station licensing policy which would provide them with more control over the location and operation of up-link and down-link facilities. In addition, it is also possible that the TCTS member carriers would press for permission to launch their own satellite.

CNCP Telecommunications

Current Strategy

The current stratey of CNCP Telecommunications appears to be to use its own facilities whenever possible. CNCP Telecommunications is not now using satellite facilities, although the associated company NorthwesTel does sublease part of a transponder to provide service to selected northern locations.

CNCP Telecommunications does not consider itself to be a distributor nor retailer of service, but rather a basic service provider. It earns its return on investment by constructing and operating facilities, and to date, using the economic criteria described earlier, satellites do not appear to have proved in.

Competitive Strategy

As in the case of the TCTS member carriers, it is unlikely that CNCP Telecommunications would support a competitor and lower its rates. CNCP Telecommunications has a long history of operating in a competitive environment. It is unlikely that under a competitive environment it would begin to

use satellites unless there were overwhelming economic advantages to doing so, and CNCP Telecommunications were in a position to use this economic advantage in competition with the TransCanada Telephone System.

There might be some opportunities for CNCP Telecommunications to compete with the TransCanada Telephones System members in a competitive environment in providing integrated satellite/terrestrial services. Any additional business as a result of this competition would come from TCTS. However, this is a rather specialized business opportunity and would not modify what we expect to be CNCP Telecommunications' overall strategy of using its own facilities whenever possible.

Telesat Canada

Current Strategy

Telesat Canada currently acts as a carrier's carrier. It participates in joint planning and provisioning with members of the TransCanada Telephone System. Under the terms of its agreement with the TCTS members, it has to date retained ownership of earth stations used by the TCTS members. The agreement provides a first right of refusal to the TCTS member carriers if Telesat decides to sell those earth stations.

As a result of decision 81-13, as modified by the Governor in Council, Telesat deals directly with broadcasters for full transponder service. Otherwise, all full and partial channels are provided through the regulated common carriers.

Competitive Strategy

In a competitive environment, we expect that Telesat would strengthen its marketing, regulatory and engineering organizations in order to provide service as an independent carrier. If possible, Telesat would offer a messaging service if the approriate interconnection agreements could be made.

EXHIBIT 2

COMPARISON OF COMPETITIVE ADVANTAGES

		SATELLITE	TERRESTRIAL
ECONOMIC		DISTANCE INSENSITIVE WITHIN BEAM POINT TO MULTI-POINT	DISTANCE SENSITIVE HUB OR LINEAR NETWORK
ACCESS		EARTH STATION AND BACK HAUL	DIAL-UP
RELIABILITY		LOWER ERROR RATE FEWER OUTAGES HIGHER NOISE RESISTANCE	HIGHER ERROR RATE MORE OUTAGES LOWER NOISE RESISTANCE
FLEXIBILITY		INCREASED FLEXIBILITY WITHIN BANDWIDTH AND SIGNAL DELIVERY POINTS CAPACITY ADDITIONS REQUIRE NEW SATELLITE	INCREASED OVERALL FLEXIBIILTY CAPACITY CAN BE ADDED GRADUALLY
TECHNICAL		DELAY REGARDLESS OF DISTANCE PROBLEMS OF SUN OUTAGES	DELAY LESS SIGNIFICANT NO PROBLEMS OF SUN OUTAGES
RISK	SPACE -	HIGHER RISK DUE TO LONGER PLANNING CYCLE AND COMMITMENT TO CAPACITY	LOW RISK ON HIGH VOLUME
	EARTH -	LOWER RISK DUE TO ABILITY TO MOVE EARTH TERMINALS EASILY	HIGH RISK ON "PRIVATE" OR LIMITED USE MICROWAVE
		RELIANCE ON U.S. FOR LAUNCH	

Telesat would plan its system independently of the TCTS planning process, would likely employ cost-based rates, and in the absence of the guaranteed rate of return provided by the Telesat-TCTS agreement, Telesat would have to justify its investment in satellite facilities on the basis of the rate of return which could be obtained.

It is unlikely, given the Canadian content requirements of the Telesat Canada Act, that Telesat could be competitive in providing earth stations. Accordingly, in a competitive environment, Telesat's main line of business would be the space segment services.

There would appear to be an opportunity for Telesat to intervene in the regulatory proceedings of most carriers to ensure that those carriers were using satellite services whenever those satellite services were economically justified. However, it is also likely that the regulators, particularly the provincial regulators, would take into account the impact of those facilities decision on the overall financial performance of the carrier, including the impact on the Revenue Settlement Plan on each carrier's share of those revenues. In this complex regulatory environment, Telesat's ability to force the use of satellite facilities, even when economically justified, would be limited.

DISCUSSION OF COMPETITIVE ADVANTAGES

Exhibit 2, opposite, provides an overview of the inherent competitive advantages of satellite and terrestrial facilities. It is apparent that the long run engineering cost of providing service is the most important factor used by decision makers when both satellite and terrestrial facilities can be used to provide the service. When location, population density, or topography mean that satellite facilities are the only reasonable way of providing service, then economic criteria really do not enter into the decision. Similarly, when technical considerations prevent the use of satellite, as is the case with most services provided by Teleglobe Canada, then again terrestrial facilities are used without regard to the economic criteria. The other criteria such as access, reliability, and risk, appear to be far lower on the priority scale than the economic criteria when those criteria are used.

EXHIBIT 3

SERVICE CATEGORIES FOR COMPETITIVE FRAMEWORK

1. Local - Switched
2. Local - Dedicated
3. Toll - Message
4. Toll - Government WATS
5. Toll - Other WATS
6. Toll - TWX
7. Telex
8. Terminals
9. Private Line (PL) - Voice Grade (VG) - TCTS - Government
10. PL - VG - TCTS - Large Business
11. PL - VG - TCTS - Other
12. PL - VG - TCTS - Canada - US
13. PL - VG - TCTS - International
14. PL - VG - CNCP - Government
15. PL - VG - CNCP - Large Business
16. PL - VG - CNCP - Other
17. PL - VG - CNCP - Canada - US
18. PL - VG - CNCP - International
19. PL - High Speed Data (HSD) - TCTS - Government
20. PL - HSD - TCTS - Large Business
21. PL - HSD - TCTS - Other
22. PL - HSD - TCTS - Canada - US
23. PL - HSD - TCTS - International
24. PL - HSD - CNCP - Government
25. PL - HSD - CNCP - Large Business
26. PL - HSD - CNCP - Other
27. PL - HSD - CNCP - Canada - US
28. PL - HSD - CNCP - International
29. Data Network (Datanet) - TCTS - Public
30. Datanet - CNCP - Public
31. Datanet - Telesat - Public
32. Datanet - Private
33. Value Added Services
34. Video - Broadcast
35. Video - Direct Broadcast Satellite
36. Video Conferencing
37. Video - Special Applications
38. Mobile/Radio Telephone
39. Non Carrier Rents/Leases
40. Telesat Leases to US
41. Consulting and Maintenance
42. Integrated Voice, Data Video

THE COMPETITIVE FRAMEWORK

The competitive framework which we have developed for purposes of estimating the market split between satellite and terrestrial facilities comprises a grouping of all services offered by Telesat Canada, CNCP Telecommunications and the TransCanada Telephone System members according to their "common competitive characteristics". That is, the services were grouped according to our perception of the way in which the choice of facilities to provide those services would be made. For example, the distinction between private line services is made only on the basis of bandwidth which would seem to be an important criterion in choosing either satellite or terrestrial facilities to provide those services. The grouping of services was performed in a rigourous fashion in order to ensure that all service offerings were included.

In formulating the competitive framework, the availability of data was also a factor. While it would have been meaningful to have separated services on the basis of distance, it was apparent that a useful breakdown of carrier revenues according to distance would not be available.

Major market segments under any of those service offerings were split out where the unique aspects of that particular market segment would be useful. For example, major end users of a particular service offering, such as the government, were separated. Similarly, because of the constraints on Teleglobe Canada, service provided to Teleglobe Canada was considered separately.

Exhibit 3, opposite, lists the forty-two service categories which were arrived at on the basis of the process described above. The basis of this categorization of services is described in more detail in Chapter IV of this report.

Competitive Scenarios

As described in the discussion of issues earlier in this chapter, we elected to formulate competitive scenarios in order to examine the impact of alternative policy options. We feel that this approach is preferable to making assumptions with respect to the policy options which would be chosen by the government.

These competitive scenarios, formulated in discussions with the Department, are described in more detail below:

1. Basic Competitive Scenario

In this scenario, the terms and conditions of competition are as described above. That is:

- Regulated competition (compensatory rate).
- Existing Telesat/TCTS Agreement terminated.
- Carrier ownership of Telesat terminated.
- Telesat offers whole and partial transponders under a general tariff.
- Telesat tariff provides for volume discounts.

We also assume under this basic competitive scenario that Telesat Canada is granted interconnection with Bell Canada and BC Tel on the same basis as is now allowed to CNCP Telecommunications.

2. Liberalized Earth Station Policy

In this scenario, earth station licensing is completely liberalized. That is, any satellite user in the 6/4 or 14/12 GHz bands may be licensed to transmit or receive from any Canadian satellite.

3. Limited National Interconnection Scenario

In this scenario, in addition to the terms and conditions of competition of the basic competitive scenario, Telesat Canada and CNCP Telecommunications are granted interconnection on a national basis. That is, the interconnection is granted by each provincial regulator, but the monopoly of the TCTS members for message toll traffic is maintained. Earth station licensing is completely liberalized.

4. Full National Interconnection Scenario

In this scenario, Telesat Canada and CNCP Telecommunications are granted full interconnection with the TCTS members nationally. That is, both Telesat Canada and CNCP Telecommunications are able to offer a message toll service in competition with TCTS. Earth station licensing is completely liberalized.

IV - ASSESSMENT OF EFFECTS OF INTERMODAL COMPETITION

In this chapter, we describe the development of the market split model and present our analyses of the quantitative and qualitative effects of intermodel competition.

CLASSIFICATION OF SERVICES

In order to determine business opportunities open to Telesat, the consulting team generated a detailed list of Bell Canada, TCTS and CNCP services from the general tariffs and grouped them according to common characteristics to arrive at service groupings from which the market split could be developed. The telecommunications services categories shown in Exhibit 3 illustrate the results of this classification process. Each service has been classified under the following headings:

- Policy, i.e., whether the service is monopoly or competitive
- Type of Network, public switched or dedicated
- System Configuration, i.e., whether terminal, loops, trunks, and/or switching facilities are required for this service
- Transmission Characteristics, whether the service is primarily voice, data, image or video
- Accessibility, whether the service is national, regional, or can access US or international networks providing similar services
- Supplier, i.e., TCTS, CNCP, private, Teleglobe and/or radio common carriers
- Rating Sensitivity, used to determine whether the service is primarily usage or distance sensitive
- Users, the range of users that would utilize this service.

EXHIBIT 4

SERVICE GROUPINGS USED FOR MODEL

TCTS MEMBER SERVICES	LOCAL BASIC AND DEDICATED TERMINAL AND MOBILE TOLL - TRANSCANADA - INTRACOMPANY PRIVATE LINES - GOVERNMENT - LARGE BUSINESS - OTHER VIDEO BROADCAST AND OTHER PUBLIC DATA NETWORKS US AND OVERSEAS MISCELLANEOUS REVENUES
CNCP SERVICES	TELEX PUBLIC NETWORKS - DATA - VOICE PRIVATE LINES - GOVERNMENT - LARGE BUSINESS - OTHER MISCELLANEOUS REVENUES
TELESAT SERVICES	PRIVATE LINES PUBLIC NETWORKS LEASES TO US MISCELLANEOUS REVENUES
OTHER DOMESTIC CARRIERS	LOCAL TOLL MISCELLANEOUS REVENUES
TELEGLOBE CANADA	TOTAL REVENUES

Sources of data for this study included the demand study carried out by Canadian Astronautics Limited, the Large Business Satellite Demand Study which was carried out as an extension to this study, and interviews with representatives of the TransCanada Telephone System, CNCP Telecommunications, Telesat Canada and the individual telephone companies across Canada. Unfortunately, data at the level of detail required to support the analysis based on the service categories listed in Exhibit 3 was not available. Accordingly, we carried out a further grouping in order to accommodate the data available. These groupings are listed in Exhibit 4, opposite.

EVOLUTION OF SERVICES

The key characteristics of satellite systems, i.e., multiple destination feature, full coverage capability of the area to be served, low bit error rate, and broadband characteristics, render them suitable for a wide range of high speed digital transmission and related services. Among these, it is worth mentioning the following applications:

- Public and private data network services. The availability of satellite links enables computers to operate with other computers at speeds and error rates similar to their own internal operating timing and error rate, i.e., the interconnection between computers is effectively transparent. Applications that are possible for these networks include:
  - data dissemination and collecting
  - distributed processing and load sharing
  - computer remote backup
  - software loading
  - remote fault diagnosis.
- Value added services. The development of data networks enables various enhanced or value added services to be provided. Value added services are defined as services which add some feature to the existing network, i.e., store and forward messaging, intelligent network, etc.
- Mobile satellite. Services which involve the merging of mobile radio and satellite technologies.

- Video conferencing. This service can be provided as an enhanced audio system integrated by high speed facsimile equipment, a slow scan video service (1.544 M bits/second x 2) or a full video broadcast quality standard service. The benefits of this service include the elimination of travel time and expenses, the ability to have support personnel present, and the ability to hold urgent meetings with a few hours notice.

- Video special applications. These applications include:

  - facsimile services, i.e., high speed document distribution services
  - electronic mail services
  - newspaper transmission services
  - video-tech
  - specialized video network, i.e., telehealth.

- Direct broadcast. This new application of satellites enables users to receive broadcast signals directly at their premises by means of a small receiver terminal.

SEGMENTATION OF MARKET

In this step of the study we considered the service groupings, the major users, and the major telecommunications service providers to develop categories to segment the market for each of the scenarios. Depending on the competitive scenario, the strategies of the terrestrial and satellite carriers, the cost to the user and various other user requirements, each grouping was split between terrestrial and satellite technologies/carriers. The quantitative relationships have been incorporated into a computer model. This model can be used to generate a revenue split between terrestrial and satellite technologies depending on the user specified inputs and assumptions. Relationships have been developed for each competitive scenario.

Assumptions and Decision Rules

In this section, we describe the assumptions and decision rules which were used in arriving at the market split between satellite and terrestrial facilities for each major service grouping under each competitive scenario.

Local - Basic and Dedicated

There is no impact on basic local service across the various competitive scenarios. However, there is an increase in dedicated local loops in order to satisfy the requirement created by additional private lines on satellite. We have estimated the increase in local dedicated circuits as a percentage of the gross savings due to conversion of terrestrial private lines to satellite. In the basic competitive scenario, 50% of the earnings were used for dedicated local loops. In the other three scenarios, 40% of the savings were used for dedicated local loops.

Terminal and mobile

The majority of the revenues in this category are terminal equipment revenues for terrestrial applications. We have included earth station, TDMA and circuit termination revenues for satellite in the satellite component of each of the individual services. There would be a business opportunity for Telesat, if it chose to provide end-to-end services, to participate in the competitive terminal market. However, for purposes of this study, we have not allocated any portion of this market to Telesat.

Should the mobile satellite (MSAT) be put into service, it would again provide a business opportunity for Telesat. However, the expected launch date for such a satellite is outside the time-frame of this study.

In summary, we do not anticipate any impact on terminal and mobile revenues as a result of satellite/terrestrial competition.

Message Toll Services

Except for the full national interconnection scenario, there is no direct business opportunity for Telesat to participate in the message toll business. Accordingly, the only message toll traffic which is carried on satellite is that portion of the eligible TCTS message toll traffic which TCTS elects to put on satellite.

Our discussions with members of the TransCanada Telephone System indicated that if Telesat were not a member of TCTS, the TCTS use of satellites would be phased out. However, because of the long time-frames associated with TCTS facilities planning, we estimate that no change in the share of message toll traffic carried on satellite would be possible prior to 1986. We therefore begin to phase out the TCTS use of satellite from message toll traffic beginning in 1986, at the rate of 20% of the eligible circuits per year. However, we also estimate that approximately 25% of the eligible circuits would have to be carried on satellite in order to provide service to the North and to remote locations where there is no economical alternative.

Under the limited national interconnection scenario, there would be a possibility for some of the DDD toll traffic and WATS to be transferred to private satellite lines and private satellite networks as a result of the improved access to those private lines. The results of the Large Business Satellite Demand Study indicated that the state of planning and coordination within the firms interviewed would likely result in little change to the existing use of DDD, and so no migration from DDD to private line has been projected under this scenario.

Under the full national interconnection scenario, we assume that both Telesat and CNCP would be able to offer competitive DDD services similar to those offered by MCI in the U.S. Customer savings of the order of 20% are realized through the use of these specialized common carriers.

We estimate that, because of the time required to implement such a service, there would be no impact in 1983. In 1985, we estimate that Telesat and CNCP would each gain about 5% of the TCTS message toll traffic from some of the large business users, and that by 1987 the market share for each of Telesat and CNCP would approach 10%.

Private Line Services

In our Large Business Satellite Demand Study, the results of which are contained in a separate report, we made estimates of the potential market for private lines and private networks on satellite. However, this potential could not be realized immediately. Under the basic competitive scenario, we assume that 10% of the market would be penetrated by 1983, with the figures for 1985 and 1987 being 30% and 60%, respectively.

Under the liberalized earth station policy scenario, we estimate that the penetration of the market would occur more rapidly, and that the market penetration figures for 1983, 1985, and 1987 would be 15%, 35%, and 70%, respectively. For the limited national interconnection scenario, we have estimated the penetration rates for 1983, 1985, and 1987 at 20%, 50%, and 80%, respectively. As the full national inter-connection scenario would not have any impact on the implementation of private line services, we have used the same penetration rates as for the limited national interconnection scenario.

Video Broadcast and Other Services

We do not expect any stimulation of the market for video services on satellite if terrestrial/satellite competition were to be introduced. In our view, the economic advantages of satellite for this application have resulted in the current market share, and both Telesat and TCTS would likely ensure that the market shares did not change as a result of competition. Broadcasting undertakings already have direct access to Telesat for purposes pursuant to the Broadcasting Act, as provided for in the Governor in Council decision following CRTC Decision 81-13.

Public Data Networks

Except in the case of full national interconnection, we estimate that terrestrial/satellite competition will not have a major effect on the segmentation of the market for public data networks. In fact, the use of satellites may stimulate the market for public data networks because satellite could provide an effective and economical back-up to the terrestrial service. However, we have assumed no impact on the first three competitive scenarios. Under the full national interconnection scenario, we see that both voice and data are potential market opportunities for satellite. Accordingly, allowing for time to penetrate this market, we have estimated that Telesat will capture 5% of the total public data network market in 1985, with its market share increasing to 10% by 1987.

US and Overseas Traffic

There is very little data available on traffic patterns for Canada-US and Canada-overseas traffic. The majority of this category is DDD. We have, therefore, assumed that 15% of this traffic is private line to the US and that the link to the gateway will no longer be required for those companies who implement private networks on satellite. Accordingly, terrestrial revenues are estimated to decline in proportion to the private line terrestrial revenues for governments and large business users.

With respect to overseas traffic, technical considerations and contractual obligations do not allow for any of this traffic to be carried on satellite either between the local loop and the international gateway, or between the international gateway and the cable termination point. For the same reasons, international traffic transiting Canada is also not permitted to be carried on satellite. Accordingly, except for a very small number of private lines for which double-hops could be acceptable, there are really no opportunities for satellite carriage of international traffic.

Results of the Market Segmentation

Using the assumptions and decisions rules described above, we developed the market split model for terrestrial/satellite competition under the various scenarios described earlier for the years 1983, 1985, and 1987. The basic data for the status quo scenario or "Telesat as TCTS member" was obtained from recent CRTC filings by the federally regulated telecommunication carriers, and from data made available to us during the interviews. We used traffic growth projections and population projections provided in the report of Canadian Astronautics Ltd. in estimating the status quo revenue figures for 1985 and 1987.

The assumptions and decision rules described above were used to divide the market between terrestrial and satellite facilities. Exhibits 5, 6, and 7, overleaf, are copies of the printouts from the computer model for the years 1983, 1985 and 1987, respectively. These three exhibits contain the basic revenue data on which the quantitative estimates of the impact of intermodal competition are based. It should be noted that other earth station suppliers in addition to Telesat have been included with Telesat for purposes of the model. They are separated out for purposes of the analysis.

ASSESSMENT OF QUANTITATIVE EFFECTS

Dealing first of all with the revenue estimates contained in exhibits 5, 6 and 7, it is apparent that the most significant effects are experienced in later time periods due to the necessary time lag in implementing and carrying out new business strategies and in acquiring the necessary facilities to provide the service. There is also a fairly predictable cycle for the market penetration of a new technology.

It is also apparent that the more significant impacts in a competitive environment would take place with changes in the earth station licensing policy and with increased interconnection both in terms of the level of interconnection and in terms of the number of carriers interconnected.

EXHIBIT 5

ESTIMATED MARKET SPLIT - 1983

1983 SCENARIOS

	TELESAT AS TCTS MEMBER				BASIC COMPETIVE SCENARIO				LIBERALIZED EARTH STATION POLICY				LIMITED NATIONAL INTERCONNECTION				FULL NATIONAL INTERCONNECTION			
	SATELLITE				SATELLITE				SATELLITE				SATELLITE				SATELLITE			
TCTS MEMBER SERVICES	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL
LOCAL-BASIC & DEDICATED	2190			0	2190			0	2190			0	2196			0	2195			0
TERMINAL & MOBILE	1130			0	1130			0	1130			0	1130			0	1130			0
TOLL - TRANSCANADA	510	11	22	33	510	11	22	33	510	11	22	33	510	11	22	33	510	11	22	33
- ADJACENT	320			0	320			0	320			0	320			0	320			0
- INTRACOMPANY	2700			0	2700			0	2700			0	2700			0	2700			0
PRIVATE LINES - GOVT	90			0	87		1	1	86	1	1	2	85	1	1	2	85	1	1	2
- LARGE BUSINESS	290			0	289	1	4	5	283	3	4	7	277	3	6	9	277	3	6	9
- OTHER	152	2	3	5	152	2	3	5	152	3	3	5	147	2	3	5	147	2	4	6
VIDEO BROADCAST & OTHER	45	32	10	42	45	32	10	42	45	32	10	42	45	32	10	42	45	32	10	42
PUBLIC DATA NETWORKS	40			0	40			0	40			0	40			0	40			0
U.S. & OVERSEAS	450			0	448			0	447			0	445			0	445			0
MISCELLANEOUS REVENUES	270			0	270			0	270			0	270			0	270			0
SUBTOTAL TCTS	8298				8193				8189				8173				8172			
CNCPT SERVICES																				
TELEX	160			0	160			0	160			0	160			0	160			0
PUBLIC NETWORKS - DATA	22			0	22			0	22			0	22			0	22			0
- VOICE	0			0				0				0				0				0
PRIVATE LINES - GOVT	25			0	24			0	24			0	24			0	24			0
- LARGE BUSINESS	83			0	80		1	1	79	1	1	2	77	1	2	3	77	1	2	3
- OTHER	43			0	42			0	42			0	40			0	40			0
MISCELLANEOUS REVENUES	5			0	5			0	5			0	5			0	5			0
SUBTOTAL - CNCPT	338				333				332				328				328			
TELESAT SERVICES																				
PRIVATE LINES	0			0	0	3	3	6	0	3	3	6	0	5	5	10	0	5	5	10
PUBLIC NETWORKS	0			0	0			0	0			0	0			0	0			0
LEASES TO U.S.	0	12		12	0	12		12	0	12		12	0	12		12	0	12		12
MISCELLANEOUS REVENUES	0	2		2	0	2		2	0	2		2	0	2		2	0	2		2
SUBTOTAL TELESAT	0	59	35	94	0	61	44	107	0	67	48	111	0	69	49	118	0	69	50	119
OTHER DOMESTIC CARRIERS																				
LOCAL	342				342				342				342				342			
TOLL	180				180				180				180				180			
MISCELLANEOUS REVENUES	18				18				18				18				18			
SUBTOTAL - OTHER DOMESTIC	540				540				540				540				540			
TELEGLOBE CANADA																				
TOTAL REVENUES	133				133				133				135				135			
GRAND TOTALS	9249	59	35	94	9229	63	44	107	9224	67	48	111	9204	69	49	118	9205	69	50	119

EXHIBIT 6

ESTIMATED MARKET SPLIT - 1985

	1985 SCENARIOS																			
	TELESAT AS TCTS MEMBER				BASIC COMPETIVE SCENARIO				LIBERALIZED EARTH STATION POLICY				LIMITED NATIONAL INTERCONNECTION				FULL NATIONAL INTERCONNECTION			
		SATELLITE				SATELLITE				SATELLITE				SATELLITE				SATELLITE		
TCTS MEMBER SERVICES	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL
LOCAL-BASIC & DEDICATED	2296			0	2313			0	2318			0	2313			0	2318			0
TERMINAL & MOBILE	1138			0	1138			0	1138			0	1138			0	1138			0
TOLL - TRANSCANADA	607	19	24	43	607	19	24	43	607	19	24	43	607	19	24	43	546	19	24	43
- ADJACENT	381			0	381			0	381			0	381			0	381			0
- INTRACOMPANY	3213			0	3213			0	3213			0	3213			0	3213			0
PRIVATE LINES - GOVT	167	0	0	0	99	1	3	4	97	1	3	4	92	2	4	6	92	2	4	6
- LARGE BUSINESS	355	0	0	0	323	5	13	18	312	7	12	19	293	10	18	28	293	10	18	28
- OTHER	157	7	4	11	175	6	8	14	175	6	8	14	170	6	8	14	163	8	8	16
VIDEO BROADCAST & OTHER	45	48	12	60	45	48	12	60	45	48	12	60	45	48	12	60	45	48	12	60
PUBLIC DATA NETWORKS	53			0	25			0	25			0	25			0	52			0
U.S. & OVERSEAS	536			0	529			0	527			0	522			0	522			0
MISCELLANEOUS REVENUES	344			0	344			0	344			0	344			0	344			0
SUBTOTAL TCTS	9224				9182				8172				9133				9061			
CNCPT SERVICES																				
TELEX	190			0	190			0	190			0	190			0	190			0
PUBLIC NETWORKS - DATA	30			0	29			0	28			0	29			0	29			0
- VOICE	0			0	0			0	0			0	0			0	24			0
PRIVATE LINES - GOVT	30			0	27	0	1	1	27	0	1	1	26	1	1	2	26	1	1	2
- LARGE BUSINESS	99			0	99	1	4	5	97	2	3	5	82	3	5	8	82	3	5	8
- OTHER	51			0	48			0	48			0	44			0	44			0
MISCELLANEOUS REVENUES	5			0	5			0	5			0	5			0	5			0
SUBTOTAL - CNCPT	405				388				385				377				401			
TELESAT SERVICES																				
PRIVATE LINES	0	0	0	0	0	6	6	12	0	6	6	12	0	8	8	16	0	11	11	22
PUBLIC NETWORKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	9	18
LEASES TO U.S.	0			0	0			0	0			0	0			0	0			0
MISCELLANEOUS REVENUES	0	2		2	0	2		2	0	2		2	0	2		2	0	2		2
SUBTOTAL TELESAT	0	78	46	116	0	88	67	155	0	91	65	156	0	99	76	175	0	111	88	199
OTHER DOMESTIC CARRIERS																				
LOCAL	380				380				380				380				380			
TOLL	221				224				224				224				224			
MISCELLANEOUS REVENUES	20				20				20				20				20			
SUBTOTAL - OTHER DOMESTIC	624				624				624				624				624			
TELEGLOBE CANADA																				
TOTAL REVENUES	168				168				168				168				168			
GRAND TOTALS	10413	76	46	116	10354	88	67	155	10341	91	65	156	10294	99	76	175	10246	111	88	199

EXHIBIT 7

ESTIMATED MARKET SPLIT - 1987

1987 SCENARIOS

	TELESAT AS TCTS MEMBER				BASIC COMPETITIVE SCENARIO				LIBERALIZED EARTH STATION POLICY				LIMITED NATIONAL INTERCONNECTION				FULL NATIONAL INTERCONNECTION			
		SATELLITE				SATELLITE				SATELLITE				SATELLITE				SATELLITE		
TCTS MEMBER SERVICES	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL	TERR	SPACE	EARTH	TOTAL
LOCAL-BASIC & DEDICATED	2536			0	2570			0	2390			0	2570			0	2570			0
TERMINAL & MOBILE	1130			0	1130			0	1130			0	1130			0	1130			0
TOLL - TRANSCANADA	771	21	25	46	771	15	18	33	771	15	18	33	771	15	18	33	617	15	18	33
- ADJACENT	484			0	484			0	484			0	484			0	484			0
- INTRACOMPANY	4981			0	4981			0	4981			0	4981			0	4981			0
PRIVATE LINES - GOVT	136			0	113	8	8	10	109	3	6	9	105	4	8	12	105	4	8	12
- LARGE BUSINESS	450			0	370	33	33	66	340	38	33	69	329	29	36	56	329	29	36	56
- OTHER	237	8	4	12	209	7	3	10	209	6	3	9	204	6	3	9	197	6	3	9
VIDEO BROADCAST & OTHER	65	56	13	69	65	56	13	69	65	56	13	69	65	56	13	69	65	56	13	69
PUBLIC DATA NETWORKS	78			0	78			0	78			0	78			0	78			0
U.S. & OVERSEAS	680			0	642			0	630			0	654			0	654			0
MISCELLANEOUS REVENUES	342			0	342			0	342			0	342			0	342			0
SUBTOTAL TCTS	10998				10983				10865				10816				10647			
CNCPT SERVICES																				
TELEX	241			0	241			0	241			0	241			0	211			0
PUBLIC NETWORKS - DATA	43			0	43			0	43			0	43			0	37			0
- VOICE	0			0	0			0	0			0	0			0	62			0
PRIVATE LINES - GOVT	28			0	32	1	2	3	30	1	2	3	29	1	2	3	29	1	2	3
- LARGE BUSINESS	126			0	104	3	9	12	95	5	9	14	91	5	10	15	91	5	10	15
- OTHER	63			0	57			0	57			0	56			0	54			0
MISCELLANEOUS REVENUES	7			0	7			0	7			0	7			0	7			0
SUBTOTAL - CNCPT	529				484				473				467				523			
TELESAT SERVICES																				
PRIVATE LINES	0			0	0	14	14	28	0	15	14	29	0	17	17	34	0	21	21	42
PUBLIC NETWORKS	0			0	0			0	0			0	0			0	0	23	23	46
LEASES TO U.S.	0			0	0			0	0			0	0			0	0			0
MISCELLANEOUS REVENUES	0	2		2	0	2		2	0	2		2	0	2		2	0	2		2
SUBTOTAL TELESAT	0	87	42	129	0	113	100	213	0	121	96	217	0	176	107	253	0	151	134	285
OTHER DOMESTIC CARRIERS																				
LOCAL	429				429				429				429				429			
TOLL	284				284				284				284				284			
MISCELLANEOUS REVENUES	23				23				21				23				23			
SUBTOTAL - OTHER DOMESTIC	727				727				727				727				727			
TELEGLOBE CANADA																				
TOTAL REVENUES	284				284				284				284				284			
GRAND TOTALS	12419	87	42	129	12298	113	100	213	12269	121	96	217	12214	176	107	253	12101	151	134	285

There is no logical way of estimating the likelihood of any of the three competitive scenarios which require policy changes actually taking place. It is apparent, however, that full national interconnection is the least likely to occur because it would require a fundamental policy change on the part of both the federal and provincial governments to put message toll traffic into a competitive environment. The limited national interconnection scenario would require a change in policy on the part of the provincial governments which regulate their respective carriers. That is, on the part of the three Prairie and four Atlantic Provinces. A liberalized earth station policy requires a change in policy by the federal government, but this change could be made unilaterally.

Exhibits 8, 9 and 10, overleaf, contain summaries of the estimated revenue by carrier and by earth station suppliers during the years 1983, 1985, and 1987. It is apparent from these summaries that there would not be a significant impact on the revenues of TCTS as result of any of the more likely competitive scenarios. Even under the full interconnection scenario, the TCTS carriers collectively would incur a 3% drop in revenues from the status quo by 1987.

CNCP Telecommunications and Telesat Canada would be affected by competition to a greater degree. In the case of CNCP, it would be expected to realize an increase in revenue only under the full national interconnection scenario. The increase in that particular case would be due, of course, to a share of the message toll traffic. Under any of the other competitive scenarios, CNCP would experience a decrease in revenues, and the decrease in revenues compared to the status quo would increase over time as Telesat was able to penetrate the market. A decrease in revenues in the order of 7 to 10% would be expected for CNCP by 1987 unless full national interconnection were to be allowed. The greater drop in revenues in the case of CNCP as compared to TCTS is because the nature of the service provided by CNCP is closer to that of Telesat in a competitive sense. In addition, a greater percentage of CNCP's total revenues come from the competitive segment of the market.

Earth station revenues are divided between Telesat and other earth station suppliers on the folowing basis:

- In the basic competitive scenario, 50% to Telesat, 50% to others;

EXHIBIT 8

1983 ESTIMATED REVENUES BY SUPPLIER

SUPPLIER	SCENARIOS				
	TELESAT AS TCTS MEMBER	BASIC COMPETITIVE SCENARIO	LIBERALIZED EARTH STATION POLICY	LIMITED NATIONAL INTERCONNECTION	FULL NATIONAL INTERCONNECTION
TCTS	8208	8193	8189	8173	8172
CNCP	338	333	332	328	328
TELESAT - EARTH	35	40	38	40	41
- SPACE	59	63	67	69	69
- TOTAL	94	103	105	109	110
OTHER EARTH STATION SUPPLIERS	0	4	6	9	9
TOTAL	8640	8633	8632	8619	8619
TELESAT PERCENTAGE OF MARKET	1.1	1.2	1.2	1.3	1.3
TRANSPONDER CAPACITY UTILIZED (MEASURED AS VIDEO CHANNELS)	64	66	68	68	68

NOTES: 1) ALL $ FIGURES ARE IN MILLION OF 1983 DOLLARS
2) EXCLUDES OTHER DOMESTIC CARRIERS AND TELEGLOBE

EXHIBIT 9

1985 ESTIMATED REVENUES BY SUPPLIER

SUPPLIER	SCENARIOS				
	TELESAT AS TCTS MEMBER	BASIC COMPETITIVE SCENARIO	LIBERALIZED EARTH STATION POLICY	LIMITED NATIONAL INTERCONNECTION	FULL NATIONAL INTERCONNECTION
TCTS	9224	9182	9172	9133	9061
CNCP	405	388	385	377	401
TELESAT - EARTH	40	54	48	53	57
- SPACE	76	88	91	99	111
- TOTAL	116	142	139	152	168
OTHER EARTH STATION SUPPLIERS	0	13	17	23	31
TOTAL	9745	9725	9713	9685	9661
TELESAT PERCENTAGE OF MARKET	1.2	1.5	1.4	1.6	1.7
TRANSPONDER CAPACITY UTILIZED (MEASURED AS VIDEO CHANNELS)	66	71	72	75	80

NOTES: 1) ALL $ FIGURES ARE IN MILLION OF 1983 DOLLARS
2) EXCLUDES OTHER DOMESTIC CARRIERS AND TELEGLOBE

EXHIBIT 10

1987 ESTIMATED REVENUES BY SUPPLIER

SUPPLIER	SCENARIOS				
	TELESAT AS TCTS MEMBER	BASIC COMPETITIVE SCENARIO	LIBERALIZED EARTH STATION POLICY	LIMITED NATIONAL INTERCONNECTION	FULL NATIONAL INTERCONNECTION
TCTS	10998	10883	10865	10816	10647
CNCP	520	484	473	467	523
TELESAT - EARTH	42	71	60	64	74
- SPACE	87	113	121	126	151
- TOTAL	129	184	181	190	225
OTHER EARTH STATION SUPPLIERS	0	29	36	43	60
TOTAL	11647	11580	11555	11516	11455
TELESAT PERCENTAGE OF MARKET	1.1	1.6	1.6	1.6	2.0
TRANSPONDER CAPACITY UTILIZED (MEASURED AS VIDEO CHANNELS)	73	80	83	85	95

NOTES: 1) ALL $ FIGURES ARE IN MILLION OF 1983 DOLLARS
2) EXCLUDES OTHER DOMESTIC CARRIERS AND TELEGLOBE

- In the liberalized earth station policy and interconnection scenarios, 33% to Telesat, 67% to others.

Other earth station suppliers could include TCTS, CNCP or non-carrier suppliers of earth station facilities.

Telesat Canada is expected to have the most significant impact on its revenue as a result of competition. Again, the increase in revenue would be greater in later years, and also under conditions of greater competition. Even the impact of a change in earth station licensing policy would be expected to have a positive impact on Telesat as a result of stimulation of the space segment.

Exhibits 8, 9, and 10 also contain Telesat's percentage share of total telecommunications revenues and the resulting tranponder capacity utilized, measured in terms of video channels.

In summary, the impact of competition on the revenues of TCTS would be expected to be very small, even in the case of full national interconnection. In the case of CNCP, a reduction in revenues of up to 10% would be expected under competitive conditions unless full national interconnection were implemented. Telesat Canada would be expected to experience significant increases in revenue as a result of competition.

The discussion above did not take into account the impact on either TCTS or Telesat of the guaranteed rate of return which is provided to Telesat under the terms of the Telesat-TCTS agreement. This matter is discussed in the following section.

Financial Impact

In this section, we carry the analysis one step further by examining the impact on net income.

Net Income of TCTS Members

There are two aspects to the impact of competition on the net income of TCTS member companies. The first is the impact of the incremental revenue change following application of the revenue settlement plan methodolgy. In terms of pre-tax income, this can be determined as the reduction in revenue multiplied

EXHIBIT 11

TCTS STATISTICS AND RATIOS

COMPANY	% of Total Revenues	Local as % of Total	Share of TCTS Settled Revenues
British Columbia Telephone Company	13.9	37.9	15.6
Alberta Government Telephones	11.4	29.9	13.5
Saskatchewan Telecommunications	4.1	29.8	5.0
Manitoba Telephone System	3.4	34.7	5.0
Bell Canada	59.6	48.8	48.4
The New Brunswick Telephone Co., Ltd.	2.6	36.2	3.3
Maritime Telegraph and Telephone Co., Ltd.	3.2	38.8	4.7
Island Telephone Company	0.3	41.2	1.0
Newfoundland Telephone Co., Ltd.	1.5	35.6	3.5
Total...	100.0	N/A	100.0

Source: DOC Telecom Statistics (1981) - Columns 1 and 2
Peat, Marwick and Partners, Review of TCTS Revenue Settlement Practices for CRTC - Column 3

by the contribution revenue ratio of each company. Exhibit 11, opposite, provides some statistics and ratios on TCTS member company revenues and the revenue settlement plan which are required to estimate the impact of competition on individual member companies. To the extent that, for any company, the number in the first column, % of total revenues of the TCTS member companies, is less than the number in the third column, the share of TCTS settled revenues, then the impact of a reduction in TCTS revenues will have a greater than average impact on the company concerned. Accordingly, the Newfoundland Telephone Company which accounts for only 1.5% of total telecommunications revenues receives 3.5% of TCTS settled revenues. Bell Canada, on the other hand, accounts for almost 60% of total telecommunications revenues of the TCTS members, but receives only 48.4% of TCTS settled revenues. Accordingly, the impact of a reduction in TCTS revenues would be more significant in percentage terms for the Newfoundland Telephone Company than it would be for Bell Canada.

The second aspect of the finacial impact on the net income of TCTS members is the guaranteed rate of return for Telesat Canada which is contained in the Telesat-TCTS agreement. Under the competitive scenarios, we have assumed that the Telesat-TCTS agreement would have to be terminated, and the TCTS members companies would not then be required to guarantee Telesat's rate of return. The amount of the transfer payments to Telesat Canada in 1983 and 1984 are expected to be $27.8 million and $22.4 million, respectively. The impact on the net income of TCTS member companies would a positive one, and the statistics and ratios in Exhibit 11 can be used to determine the relative benefit to each member company.

Exhibit 12, overleaf, illustrates the impact of the basic competitive scenario on each of the TCTS member companies using figures for the transfer payments to Telesat of $27.8 million in 1983, an estimated $25 million in 1985, and an estimated $13 million in 1987.

It should be noted here that the impact of revenue decreases on TCTS member companies has been estimated by considering that all revenue changes are changes in revenues for settlement by the TCTS Revenue Settlement Plan. This

EXHIBIT 12

IMPACT OF BASIC COMPETITIVE SCENARIO

	% INCREASE OR (DECREASE) IN TOTAL REVENUES		
COMPANY	1983	1985	1987
British Columbia Telephone Company	0.2	(0.2)	(1.0)
Alberta Government Telephones	0.2	(0.2)	(1.1)
Saskatchewan Telecommunications	0.2	(0.2)	(1.1)
Manitoba Telephone System	0.3	(0.3)	(1.4)
Bell Canada	0.1	(0.2)	(0.8)
The New Brunswick Telephone Co., Ltd.	0.2	(0.3)	(1.2)
Maritime Telegraph and Telephone Co., Ltd.	0.2	(0.3)	(1.4)
Island Telephone Company	0.4	(0.7)	(3.0)
Newfoundland Telephone Co., Ltd.	0.4	(0.4)	(2.2)

procedure appears to be warranted insofar as most services affected will be the long-haul TCTS services.

Net Income of CNCP Telecommunications

The impact on CNCP in the short term will be essentially a flowing through of the decrease in revenues to the bottom line since most expenses are fixed. Accordingly, based on projected 1983 net income before taxes of $23 million, the basic competitive scenario would result in a drop of about 25% in net income before taxes. Over the longer term, it is assumed that operating expenses could be adjusted to reflect the reduced traffic. However, it should also be noted that the impact of competition increases over time.

Net Income of Telesat Canada

As in the case of TCTS, there are two aspects to the financial impact of competition on Telesat Canada. Upon termination of the Telesat - TCTS agreement, Telesat would no longer receive the guaranteed rate of return. Accordingly, Telesat's total revenues would decrease by $27.8 million in 1983, and an estimated $25 million in 1985 and $13 million in 1987. However, Telesat's operating revenues would be expected to increase, and the contribution of the increased space and earth revenues in the medium term is expected to more than offset the reduction in revenue due to removal of the guaranteed rate of return. It is assumed that all incremental space revenues would result directly in increased net income because all fixed expenses associated with the space segment are covered. Earth station revenues, on the other hand, would be expected to make a smaller contribution to the bottom line due to the costs which would have to be incurred to generate this income. Using the ratio of Telesat's net operating revenue to total revenues as an indication of the contribution of these incremental earth station revenues to the bottom line, and including the expected increase in space segment revenues and the reduction in transfer payments from TCTS, the financial impact of the basic competitive scenario on Telesat is estimated to be as follows:

EXHIBIT 13

IMPACT ON TCTS MEMBER COMPANY RATES

COMPANY	INCREASE IN LOCAL RATES TO OFFSET REDUCTION IN REVENUES*					
	1983		1985		1987	
	$M	%	$M	%	$M	%
British Columbia Telephone Company	NO		2.7	0.6	15.9	2.7
Alberta Government Telephones			2.3	0.7	13.8	3.7
Saskatchewan Telecommunications	INCREASE		0.9	0.8	5.1	3.8
Manitoba Telephone System			0.9	0.8	5.1	3.9
Bell Canada	REQUIRED		8.2	0.3	49.4	1.5
The New Brunswick Telephone Co., Ltd.			0.6	0.7	3.4	3.3
Maritime Telegraph and Telephone Co., Ltd.			0.8	0.7	4.8	3.5
Island Telephone Company			0.2	1.7	1.0	7.4
Newfoundland Telephone Co., Ltd.			0.6	1.2	3.6	6.1

* Reduction in Revenues calculated as the difference between the status quo scenario and the basic competitive scenario.

Year	Contribution From Space	Earth	Guarantee	Total
1983	$ 4M	$ 1M	$(27.8)M	$(22.8)M
1985	12M	3M	(25.0)M	(10) M
1987	26M	7M	(13.0)M	20 M

These figures indicate that Telesat would have some difficulty in the short term, but would benefit in the medium term even under the basic competitive scenario.

Telesat's financing, including the line of credit agreement with its bank and the indentures governing its private debt placements, is based on the Telesat - TCTS agreement being in place and with the TCTS member companies providing a guaranteed rate of return to Telesat. Whether or not Telesat's lenders would be prepared to continue to finance Telesat in the absence of the guaranteed rate of return is a question which must be raised, but which is beyond the scope of this study.

Impact on Rates

A major concern with respect to the impact on rates is any increases in local rates which would result from increased competition and the corresponding decrease in the contribution revenues which TCTS member companies would receive. Using the statistics and ratios in Exhibit 11, combined with the decrease in total revenues contained in Exhibit 12, one can estimate the impact of the basic competitive scenario on rates. Again, any company which has a high percentage of toll revenues and which is, therefore, using toll revenues to heavily cross-subsidize the provision of local service, is likely to experience an increase in local rates in order to maintain its rate of return.

Assuming that increases in local rates are required to make up the entire deficiency in total revenues due to the imposition of a competitive environment, the percentage increase in rates in 1985 and 1987 for each member company would be as shown in Exhibit 13, opposite. No increases would be

required for 1983 because the drop in revenues is more than offset by the termination of the transfer payments to Telesat. The impact is greater in later years when the implementation of competition is more complete. However, it does not appear that significant increases in local rates would result in the case of any one of the TCTS member companies.

Impact on the Aerospace Industry

In order to estimate the impact of competition on the aerospace industry in Canada, we looked at the impact from the perspective of both the space segment and the earth segment. In the case of the space segment, we would not expect any impact because the increased utilization of satellites over the period examined in this study would only result in the utilization of existing excess capacity.

In order to estimate the impact due to increases in the earth segment, we converted the incremental annual costs of earth stations to capital costs and then used sales revenues per employee and the approximate Canadian content in order to estimate the number of jobs created. A recent study carried out by Peat Marwick and Partners for the Department of Industry, Trade and Commerce estimated annual sales revenue per employee in the Canadian aerospace industry at $75 thousand. Using the growth in earth stations from year to year, and based on 40% Canadian content, the basic competitive scenario would result in incremental capital expenditures on earth stations of the order of $50 million per year over the medium term, resulting in the creation of approximately 230 additional jobs.

If the earth station ownership policy were liberalized, control over Canadian content would be considerably diminished because Section 8 of the Telesat Act would have less influence. Under a liberalized earth station ownership policy, it would place Telesat at a competitive disadvantage to use Section 8 of the Telesat Act. The impact on the aerospace industry would be less as a result of imported earth stations.

ASSESSMENT OF QUALITATIVE EFFECTS

In this section of the report, we comment on the impact of satellite/terrestrial competition on a number of qualitative issues raised by the Department in its Terms of Reference. In assessing the impact of intermodal competition on these issues, we have relied mainly on the results of the interviews carried out for this study and for the Large Business Satellite Demand Study.

Impact on Range of Services Offered

It became apparent during our interview program, particularly during our interviews with large business users, that services such as integrated voice/data/video services were not being marketed by carriers in Canada to any great extent. If Telesat were operating in a competitive environment, we would expect that new products and services would be developed to counter the new competitive influences in much the same way as CNCP Telecommunications and the TCTS member companies now compete. This would lead logically to an increase in the range of services offered.

Service to the North

Services to the North of Canada are provided by Bell Canada and by NorthwestTel. Due to the smaller footprint of the 14/12 GHz satellites, all service to North of 60° is provided in the 6/4 GHz frequency band. Our Large Business Satellite Demand Study indicated that many of the services required by these users would be provided by 14/12 GHz satellites. However, many video applications require the national coverage provided 6/4 GHz satellites. It is unlikely that the requirement at 6/4 GHz would be reduced so as to make the service unviable. There is, therefore, no reason to expect that service to the North would be impaired.

Telesat Interconnection with Provincially-Regulated Carriers

Using the experience of CNCP Telecommunications as an indication of the likely competitive strategies of the provincially-regulated TCTS members under competitive conditions, we consider it unlikely that Telesat would obtain interconnection with these carriers. However, we did not explore this question with all provincial governments, and accordingly our comments on this issue are not based on a thorough study.

Impact on TCTS Settlement Procedures

In a competitive environment, some adjustments might have to be made to the TCTS revenue settlement procedures, particularly if interconnection were to be permitted. The present settlement methodology calls for separate settlements to be carried out for monopoly and competitive services. Again, some adjustments might have to be made as more services would be classified as competitive services.

Competitive Satellites

We view the likelihood of operators of competitive satellites entering the market as being dependent entirely on government policy in this regard. Competition from U.S. satellites, if allowed, would result in head-to-head competition between Telesat Canada and those U.S. operators, and U.S. satellite operators have a distinct competitive advantage in being able to cover the entire mainland of the United States plus the densely populated areas of southern Canada.

Satellites such as MSAT, on the other hand, would not be in head-to-head competition with Telesat, but would be offering services in competition with certain services of the TCTS member companies. However, in the case of MSAT, there would be considerable stimulation of new markets as well.

V - CONCLUSIONS

In this chapter of the report, we list our major findings, discuss these findings, and present our conclusions.

MAJOR FINDINGS OF THE STUDY

In carrying out this study, we were required to make a number of estimates and assumptions due to shortages of data, lack of acceptable forecasts and uncertainties with respect to policy alternatives. We have attempted to specify our assumptions, estimating methods and decision rules at the appropriate points in this report. In interpreting these findings, the underlying assumptions and estimates must be kept in mind.

With respect to the effect on carrier revenues, our findings are as follows:

- TCTS member companies would incur a slight loss in operating revenues under competitive conditions. In the medium term, under the basic competitive scenario, reductions in operating revenue would be of the order of 1-2%.
- CNCP Telecommunications would experience a reduction in revenue of 7-10% in the medium term, unless full national interconnection was permitted.
- Telesat would receive an increase in operating revenues under all competitve scenarios. In the medium term, increases of the order of 60-80% could result even with limited national interconnection.

Our findings with regard to the effect of competition on carriers' net incomes are as follows:

- TCTS member companies would each experience a slight reduction in net income due to decreased operating revenues as a result of competition. In the short term, however, net income would actually increase upon termination of the guaranteed rate of return to Telesat.
- CNCP Telecommunications would incur a significant drop in net income in the short term due to excess capacity, with modest improvements from this position over time as normal growth takes place.

- Telesat Canada would suffer an extremely significant short term drop in net income due to loss of the guaranteed rate of return, which would be offset to some extent by increased operating income. Over the medium term, (three to five years), Telesat Canada would benefit from competition.

With respect to the impact on local rates, we found:

- Under the basic competitive scenario, no short term increases in local rates would be required to offset the effects of competition for TCTS members.

- Over the medium term, the most significant impact on local rates would take place if increases in local rates were used to offset the entire impact of competition, and the basic competitive scenario indicates local rate increases ranging from 2% in the case of Bell Canada to 7% in the case of Island Telephone Company would then occur.

- Somewhat higher increases would result from the other three competitive scenarios, particularly in the case of the full national interconnection scenarios.

The impact on the Canadian Aerospace industry is as follows:

- Provided Canadian content is maintained, the earth station manufacturing industry will benefit by upwards of 230 jobs, depending on the competitive scenario.

- Changes in the earth station licensing policy could reduce the government's influence with respect to Canadian content.

- Although there would be no immediate impact on the Canadian space manufacturing industry, increased utilization of existing satellites would be expected to benefit this segment of the industry by ensuring the renewal of space capacity as existing satellites are retired.

Our findings with respect to the less quantitative issues are:

- The ability of Telesat to continue to borrow in order to satisfy its cyclical debt requirements without benefit of the guaranteed rate of return from TCTS members is uncertain.

- Short term impacts of competition on the net income of Telesat due to termination of the guaranteed rate of return would make financing difficult, although medium term prospects appear to be good.

- The impact of competition on the range of services offered is expected to be favourable to telecommunications users.

- No impairment of service to the North is expected.

- In a competitive environment, Telesat would be expected to be granted limited interconnection with Bell Canada, British Columbia Telephone Company and CNCP Telecommunications. The granting of interconnection with the provincially-regulated telephone companies is questionable.

- The impact of competition on TCTS revenue settlement procedures would be minimal.

- The desirability of competition in particular circumstances, including competition from other satellite operators, is entirely dependent on broad government policy considerations.

DISCUSSION

In arriving at these findings, we have necessarily based our analysis on assumptions, estimates and forecasts for a number of uncertainties and variables. We are confident, however, that our approach to the formulation of the competitive framework which included an extensive interview program, and our further work on the Large Business Satellite Demand Study, render these findings valid.

We are aware that the telecommunications carrier industry is wary of competition, and some readers may find our estimates of the impact of competition optimistic. We would point out that we have not projected any significant stimulation of the market as a result of competition, and that our estimates should accordingly be viewed as conservative.

In our view, the study benefitted to a significant extent from the data and information gathered during the Large Business Satellite Demand Study. It is primarily on the basis of these results that we based our market split, and it is our firm view that there is an untapped market of sophisticated telecommunications users who are prepared to invest time and money to upgrade their telecommunications capabilities.

CONCLUSIONS

The conclusions of our study of the effect of intermodal (satellite/ terrestrial) competition on the Canadian telecommunications industry, on its subscribers and on the Canadian aerospace industry are the following:

- For members of the TransCanada Telephone System and their subscribers, the effects of competition on rates and revenues would be very small as long as the monopoly status of message toll is maintained.

- For CNCP Telecommunications, the effects of competition would be expected to be quite significant as long as the monopoly status of message toll is maintained. As most of its services are offered on a competitive basis, CNCP Telecommunications would probably not seek to increase other rates to offset this effect. Its subscribers would not be expected to experience a change in rates.

- The short term financial performance of Telesat Canada would suffer to a very significant extent due to the loss of the guaranteed rate of return. In the medium term, however, financial prospects would be quite good. The question of the ability of Telesat to continue to obtain debt financing in the absence of the guaranteed rate of return is beyond the terms of reference of this study.

- The Canadian aerospace industry would benefit from the creation of a competitive environment, provided that Canadian content levels can be maintained.

- Stimulation of demand and the development of new service opportunities for both satellite and terrestrial as well as integrated services could result from marketing efforts directed to large businesses and governments.

- Other than modest increases in local rates, if this is the approach used to offset the effects of competition, no negative impacts on the range or quality of services would be expected to result from satellite/terrestrial competition.

APPENDIX A

LIST OF ORGANIZATIONS/INDIVIDUALS INTERVIEWED

APPENDIX A

LIST OF ORGANIZATIONS/INDIVIDUALS INTERVIEWED

ORGANIZATION	INDIVIDUAL
Federal Government	
Department of Communications	T. G. Hughes
	P. Davis
	G. Henter
	R. Bennett
	G. McCullough
	N. Hockin (Ms.)
	C. Franklin
	A. Malozzi
	D. Buchanan
	B. O'Neil
	D. Waing
	J. Hawkins
	D. Sum
Canadian Radio-Television and Telecommunications Commission	M. Andrew
	D. Bell
	D. Lonergan (Ms.)
	B. Richardson

Consumer and Corporate Affairs	I. Nielsen-Jones
	H. Chandler
	C. Stevenson
Treasury Board	T. Ellison
Ministry of State for Economic and Regional Development	C. Burke
Canadian Transport Commission	G. Hariton

Provincial Government

Alberta Public Utilities Board	N. MacDonald
	B. Shymanski
Saskatchewan Government	D. Smith
New Brunswick Government	W. Steeves
Newfoundland Government	P. Hall (Ms.)
Nova Scotia Government	D. Colville
Nova Scotia Public Utilities Commission	S. Drury
Government of Ontario	D. Long

Carriers

Telesat Canada	E. Thompson
	R. Lester
	F. Bartlett
Teleglobe Canada	J. Murray
	Y. Labelle
	M. Eui (Dr.)
CNCP Telecommunications	J. Schmidt
	W. Withers
	R. Corbin (Dr.)

TransCanada Telephone System	R. Montgomery
	K. Teelucksingh
	J. McBrearty
	W. Anderson
Bell Canada	R. Coleman
British Columbia Telephone Company	W. K. McCourt
	P. Muncaster
	G. F. Auchintek
	M. Brown
	W. McIntyre
	D. Byrne (Ms.)
Alberta Government Telephones	G. Bidulock
Saskatchewan Telecommunications	F. Degenstein
Manitoba Telephone System	G. Backhouse
	N. Fedorchuk
	D. Wardrop
Newfoundland Telephone Co.	B. Newell
New Brunswick Telephone Co.	B. Cosman
Maritime Telegraph and Telephone Co.	I. Duvar
Island Telephone Company	I. Duvar
edmonton telephones	B. Baptie
Canadian Independent Telephone Association	P. Rogers
NorthwesTel	(D. Campbell
Terra Nova Telecommunications	(D. Bruce

Users

The Canadian Press	E. Fudurich
TV Ontario	P. Bowers
Canadian Satellite Communications Inc.	J. Underhill
Canadian Broadcasting Corporation	G. Goucheon
	R. Anderson
	D. Garforth
Imperial Oil Limited	M. Delisle
Canadian Industrial Communications Assembly	P. Godfrey

Other Organizations

Canadian Astronautics Limited	D. Ng
	V. Gore
	J. Amyot
Canadian Commercial Corporation	A. Dufays